DOCUMENT RESUME

ED 340 801 UD 028 471

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TITLE SEEK and College Discovery Summer Programs: Prefreshman, English-As-A Second Language, Postfreshman, and Science, Mathematics & Technology Institutes. 1990 Evaluation Report.
INSTITUTION City Univ. of New York, NY. Office of Student Affairs and Special Programs.
PUB DATE 91
NOTE 43p.
PUB TYPE Reports - Evaluative/Feasibility (142)

EDRS PRICE MF01/PC02 Plus Postage.
DESCRIPTORS *College Students; English (Second Language); Higher Education; *High Risk Students; Mathematics Instruction; *Program Evaluation; Reading Instruction; Remedial Instruction; *Remedial Programs; Science Instruction; *Summer Programs; Technical Education; Urban Universities; Writing Instruction
IDENTIFIERS *City University of New York; *Project SEEK

ABSTRACT

This study evaluates four summer programs (two prefreshman programs, one postfreshman program, and a Science, Mathematics, and Technology Institute) designed to assist at-risk college students in the City University of New York. Section I describes the two prefreshman programs: (1) the SEEK and College Discovery Prefreshman Summer Program, which provides 6 weeks of basic skills instruction in reading, writing, and mathematics; and (2) the SEEK English-As-A Second Language Prefreshman Summer Program, which offers 6 weeks of intensive English as a Second Language instruction. Using course completion and fall registration rates and pretest and posttest scores as evaluation measures, both programs were found to be effective. Section II describes the evaluation of the 1990 Postfreshman Summer Program, which is designed to meet the needs of continuing students who had encountered difficulty or had not yet met minimum university skill standards. Pretests and posttests, completion rates, and a student survey found high rates of completion and increased score levels especially in reading and mathematics. Section III presents the findings of the evaluation of the 1990 Summer Science, Mathematics, and Technology Institute. Completion rates and testing results indicate that this program made a significant contribution in preparing students for more advanced college-level mathematics and science courses. The high completion rates especially attest to its effectiveness. Included are 12 graphs, two data tables, and six references. (JB)

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Evaluation Report for 1990 SEEK and College Discovery Summer Programs

Prefreshman
English-As-A Second Language
Postfreshman
Science, Mathematics & Technology Institute

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EVALUATION REPORT FOR 1990 SEEK AND COLLEGE DISCOVERY SUMMER PROGRAMS

- SEEK AND COLLEGE DISCOVERY PREFRESHMAN SUMMER PROGRAM
- SEEK ENGLISH-AS-A SECOND LANGUAGE PREFRESHMAN SUMMER PROGRAM
- SEEK AND COLLEGE DISCOVERY POSTFRESHMAN SUMMER PROGRAM
- SEEK SCIENCE, MATHEMATICS & TECHNOLOGY INSTITUTES

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SPRING 1991

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ACKNOWLEDGEMENTS

The authors wish to thank Eleanor Pontes, University Dean for Student Affairs and Special Programs, for her support and skillful review and editing of the text; Lourdes Mangual, Director of the Office of Special Programs, for her help and encouragement throughout; and Shelley Ast, Research Consultant, for writing and editorial assistance.

INTRODUCTION

For over twenty-five years The City University of New York, through its Office of Special Programs, has served the most disadvantaged, the most academically at-risk students in the State of New York. A typical Special Programs student--one in SEEK at a senior college or in College Discovery at a community college--arrives at college with many if not all of the problems that impede success: the need for financial aid, remedial work in most of the basic skills areas, and support from counselors and tutors to help overcome, in many instances, years of failure. Too often, entering students understand little of the obstacles they must overcome to reach their goal of attaining a college diploma. Grappling with the issue of how best to provide effective programs to retain students who enter college with greater academic and economic problems than other students is at the heart of the inception and development of the Prefreshman Summer Program (PFSP).

Since its inception in 1979, the PFSP has served to bridge the gap between students' high school or work experience and the realities of college. The initial concerns, which became the goals of the Program, were how to accomplish in a six-week summer program the following: (1) improvement of basic skills for prefreshmen who must eventually meet University-wide standards of competency on skills assessment tests; (2)reduction of time spent in remedial coursework; and (3)successful transition to a college environment. The summer seemed ideal for the attainment of these goals. Here, entering students would receive an instructional program tailored to their academic needs, buttressed by specialized counseling and tutoring services, along with a stipend to support some of their educational expenses. Here, with greater opportunity than during the academic year, instructors, counselors and tutors could coordinate their efforts, plan jointly, and share effective strategies. It was this coming together, this confluence of specific elements carefully thought through and planned, that then became the model for the Prefreshman Summer Program.

Clearly, from data accrued from ten years of evaluations, the PFSP is a crucial first step on the higher educational ladder. Each summer the Program retains most of its participants. It accelerates the movement of entering students from remedial to college-level coursework. Students increase their scores substantially on the CUNY skills assessment tests. Many pass the tests at the end of the summer program. Longitudinal comparison studies of students who attend the PFSP and those who enter in the fall without the summer experience show that PFSP students attain higher grade point averages and remain in college over long periods in higher percentages.

By 1985 it was possible to focus on specific groups of Special Programs students and to design programs to address their needs. One such group was the English-as-a second language population. With over one fourth of all SEEK students in need of ESL instruction, the Office of Special Programs piloted an ESL Prefreshman Summer Program in 1985 for 100 incoming SEEK students. Although structured similarly to the PFSP, it provides ESL instruction with special emphasis in the reading and writing aspects of language learning. Based on external evaluations of the program showing its success in retaining students, advancing them to higher levels of ESL instruction and assisting them in making the transition from high school to college the ESL PFSP was instituted in 1987.

By 1987 the PFSP again expanded with the addition of two more pilot programs. The Science, Mathematics and Technology Institute (SMTI) was conceived to address the problem of minorities entering college with especially weak preparation in science and mathematics and their underrepresentation in the science and mathematical fields. The Institute, piloted with 100 SEEK students at three colleges was designed for prefreshmen and continuing students who are beyond the

basic skills level yet must fulfill math and science distribution or core requirements needed for graduation, and those who are interested in pursuing careers in related fields. The Postfreshman Summer Program, similar in structure to the PFSP, was designed for SEEK continuing students still in need of basic skills instruction. It was piloted at eight colleges for 200 students. Both programs were evaluated by external evaluators for two summers and, like the ESL PFSP, were deemed successful. They were instituted in 1989.

In 1990, the University's Office of Special Programs administered 36 separate summer programs for 1700 students at the senior and community colleges. The PFSP was offered at the seventeen CUNY undergraduate campuses, the ESL PFSP and Postfreshman Summer Program were offered on eight senior college campuses and the SMTI operated at three of the ten senior colleges. The designs of the summer programs, as in past years, were informed by previous evaluations and such factors as the institution's goals and student needs.

The present publication is the first to present findings from the four summer programs in one volume. While each of the sections stands as a discrete report, together they provide the reader with an overview of summer program accomplishments. Section I reports retention and academic achievement data for the PFSP and ESL PFSP; section II reports the same for the Postfreshman Summer Program, and; section III describes SMTI offerings in terms of objectives, program descriptions and results.

What started as a pilot program in 1979 has grown over the years into a multi-faceted set of specialized programs, serving as a model for the University for even larger numbers of CUNY regularly admitted students. The SEEK and College Discovery summer programs have intervened to increase the academic performance and retention for the most academically underprepared and economically disadvantaged students in the University. The Program will continue to search for effective strategies and interventions to promote quality education for its students.

Laraine Bengis
Coordinator
Summer Programs

SECTION 1

1990 PREFRESHMAN SUMMER PROGRAM

- SEEK AND COLLEGE DISCOVERY PREFRESHMAN SUMMER PROGRAM
- SEEK ENGLISH-AS-A SECOND LANGUAGE PREFRESHMAN SUMMER PROGRAM

OVERVIEW

PREFRESHMAN SUMMER PROGRAM

The SEEK and College Discovery Prefreshman Summer Program (PFSP) provides six weeks of basic skills instruction in reading, writing and mathematics to entering students who fail to achieve proficiency on the CUNY Freshman Skills Assessment Program tests.

Piloted in the summer of 1979 with 250 students at three colleges, the PFSP has expanded to include some 1000 students at every senior and community college of the University.

As in past summers, all the programs provided group orientation, individual counseling and tutoring, integrated to varying degrees with basic skills instruction. At some of the colleges, instruction itself was interdisciplinary, with reading and writing themes and concepts overlapping. Most programs provided in-class tutoring as well as tutoring out of the classroom. Many of the counselors were integrated into the learning process through attending classes and witnessing student/teacher interaction first-hand. In essence, the PFSP integrates the numerous academic and support systems of a college into "a whole" with one purpose in mind: to better prepare the entering student, academically and socially, to effectively compete and achieve in college.

ENGLISH-AS-A SECOND LANGUAGE PREFRESHMAN SUMMER PROGRAM

Currently, in the New York State public schools there are approximately 128,000 students for whom English is a second language (ESL). A 1989 student experience survey of undergraduates by The University's Office of Institutional Research shows that 18% of all undergraduates have taken at least one remedial course in English-as-a Second Language. These students, an ever increasing population in CUNY, are in need of improving their English language skills in order to be able to successfully complete their college work. ESL students very often have had to adapt to a different cultural system, new geography, a different climate, and a different socioeconomic system. In addition, they have had to learn a new language and adjust to learning a language that is lengthy and cumulative.

With over one fourth of SEEK students in need of English-as-a second language instruction, and the PFSP evaluations having shown a sizeable population in the summer programs with ESL needs, the ESL PFSP was piloted in 1985. After two summers of external evaluations finding the program effective, it was institutionalized in 1989.

The SEEK ESL Program offers six weeks of intensive ESL instruction with special emphasis in the reading, writing and aural aspects of language learning. Tutoring, individual and group counseling and orientation are also integral parts of the program.

In 1990, Baruch College, Brooklyn College, The City College, Hunter College, Lehman College, Queens College, and York College offered ESL summer programs. Each college designed its own curriculum and program of activities within the parameters of the guidelines for the SEEK summer program. The objectives were the following:

1. providing ESL instruction in listening, speaking, reading and writing.

2. providing counseling sessions which would orient students to the college and help prepare them for what was expected of them as college students.

3. providing tutors in-class and outside the classroom to assist students with their assignments and work in general, and

4. reducing the amount of time ESL students spend in remediation.

The students came from more than 20 different countries located in the following regions:

- Asia - (Burma, Cambodia, China, Hong Kong, Laos and Vietnam)
- Caribbean - (Dominican Republic, Haiti, Jamaica, and Puerto Rico)
- Central America - (El Salvador, Guatemala, and Honduras)
- South America - (Colombia, Ecuador, Uruguay and Venezuela)
- Europe - (primarily countries in the Soviet Union)

With the addition of a separate English-as-a Second Language PFSP, the focus of the Prefreshman Summer Program is on the needs of students with English as their primary language. The ESL PFSP can devote its full energies to providing an intensive program of language instruction for those students who require it.

DESIGN AND METHODOLOGY

The City University evaluates the basic skills proficiency of all entering students by administering the Freshman Skills Assessment Program (FSAP) tests in reading[1], writing[2], and mathematics[3]. Students are required to meet University-wide minimal standards of competency or their college's higher standards on the tests by the time they are ready to enter the upper divisions of The City University. Students who fail one or more of the tests are placed in corresponding remedial courses designed to strengthen their skills. Students in this category are urged by their respective colleges to participate in either the PFSP or the ESL PFSP. Those who participate in the programs are enrolled in one or more basic skills courses, depending on the number of tests failed and other factors, such as availability of time. (See Pereira and Cobb, 1988, and Pincus, 1989, for more in-depth analysis of why some students enroll and others don't.)

Evaluations of the PFSP and the ESL PFSP include the following measures: course completion and fall registration rates, pre- and post-test scores, and basic skills course placement in the fall semester. The enrollment and performance data were supplied to the Office of Special Programs by the individual campus programs. Where applicable, comparisons are made between present findings and those reported in previous evaluation reports. An interpretation of data should be made considering the following:

1. Criteria for admission into the PFSP varied from college to college. Some programs selected students with near-passing scores on the CUNY Freshman Skills Assessment Program tests while others enrolled students with the lowest scores.

2. Criteria for student advancement to higher level courses in the fall differ for each program. In most cases, teacher judgment was the final determinant for fall course placement, based on one or a combination of these factors: (a) a significant gain on the FSAP retest; (b) a passing score on the retest; (c) performance in class. Advancement rates are also affected by the number of remedial courses in a sequence available to students at their particular college. Student advancement includes both: (a) those students who passed the post-test; and (b) those who did not, but who made enough progress to enter a higher level remedial course in the fall than they would have based only on their pre-test score.

3. CUNY Freshman Skills Assessment Program test results include only those students for whom pre- and post-test scores were available. Because of student absence, teacher judgment,

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1 The CUNY reading assessment test is the reading comprehension subtest of the Descriptive Test of Language Skills. The test consists of 45 multiple-choice questions on understanding main ideas, understanding direct statements, and drawing inferences. (Because the University-wide minimal passing score varies, depending on which of the six test forms were administered, scores were scaled to a common metric.)

2 The CUNY writing assessment test is a formal method for evaluating student writing samples, using holistic rating and scoring techniques. The technique was developed by the Educational Testing Service.(The University-wide minimal passing score is 8 of a possible 12 points.)

3 The CUNY mathematics assessment test is a 40-item multiple choice test of mathematical skills in arithmetic and algebra. The test was created by a CUNY task force. (The University-wide minimal passing score is 25 of a possible 40 points.)

or campus policy (e.g. not allowing students with no exposure to algebra to take the math post-test) some students were not post-tested. Where tables in this report indicate "Passed Post-Test," this refers to those who failed the pre-test and took and passed the post-test. The reading and writing post-test pass rates for ESL students are expectedly much lower than for English as a primary language SEEK students. This group must take many more semesters of language instruction before developing the skills needed to pass the tests.

4. The University has established minimal standards of competency on the Freshman Skills Assessment Program tests. However, many colleges have higher proficiency requirements and admitted students into the PFSP who met the University's but not the college's standard for competency in basic skills.

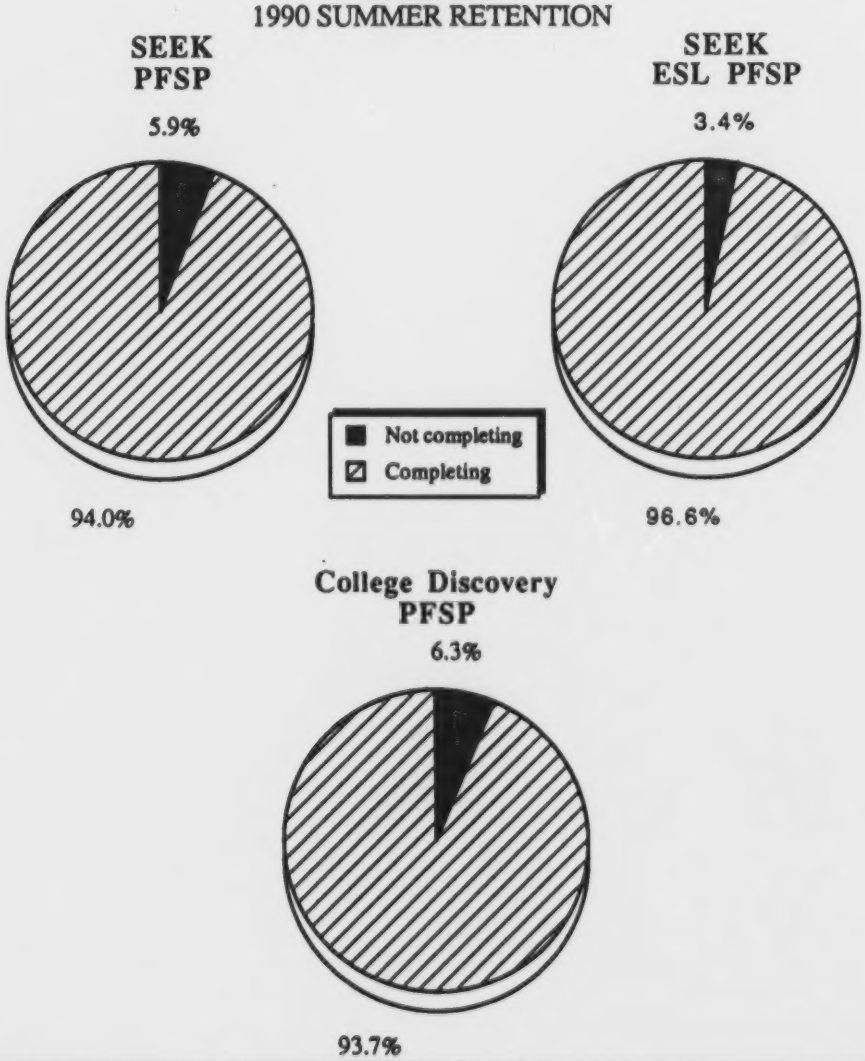
FINDINGS

For reporting purposes below, the summer programs for SEEK participants in the senior colleges and College Discovery in the community colleges whose primary language is English are referred to as SEEK PFSP and College Discovery PFSP, respectively. The SEEK summer program for English-as-a second language students is referred to as SEEK ESL PFSP.

PFSP Retention and Fall Enrollment

The summer program, as in past years, retained the vast majority of its participants. Ninety-four percent (94%) of the 605 students enrolled in the SEEK PFSP and 97% of the 237 SEEK ESL participants completed the program. Comparable figures for the CD PFSP is 94% of the 380 enrollees.

FIGURE 1
1990 SUMMER RETENTION



These figures reaffirm past findings indicating that students who make the commitment to attend the prefreshman program complete it. Retention rates over the past ten years have averaged 92%.

More significant is the fact that most of the SEEK and College Discovery PFSP completers (92% and 93% respectively) as well as the SEEK ESL completers (94%) continued their enrollment in the fall semester. A ten year analysis of fall enrollment patterns for summer program students reveals that fall enrollment remains high each year, with a mean rate of 93%. The 93% rate far exceeds the enrollment rate for all SEEK and College Discovery allocants; approximately 58% of SEEK and 49% of CD allocants actually enroll.

When a Special Programs allocant -- an applicant assigned to the campus of his/her choice -- attends the summer program it enhances significantly the probability that the student will attend The City University (see Hofmann, 1985). Even allowing for the possibility that the more motivated student attends the PFSP, data suggest that the summer experience strengthens students' commitment to education and has a positive effect on enrollment in the fall semester. These findings correspond to an OIRA study which found a positive effect of summer school attendance on fall re-enrollment, particularly for academically and economically disadvantaged students (Kapsis and Protash, 1983). Although the study examined the experiences of continuing students, its findings are applicable to prefreshman summer school attendees as well.

ACADEMIC ACHIEVEMENT

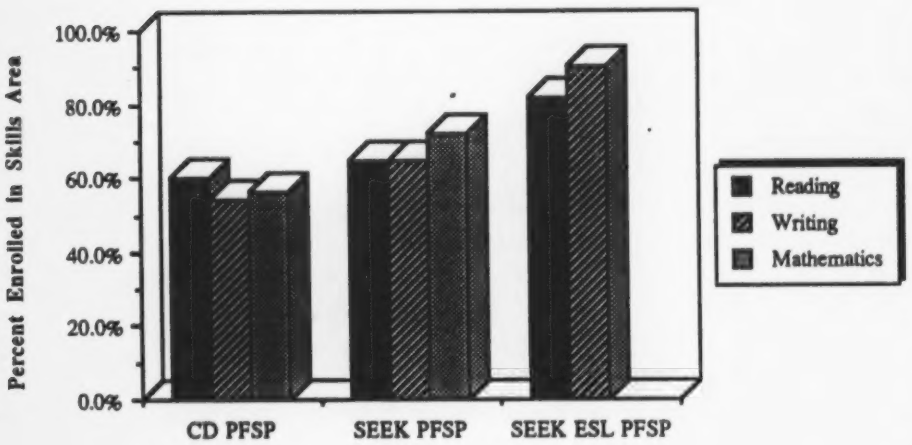
This section presents reading, writing and math achievement: course completion; rates of advancement to higher level courses; pre- to post-test gains; and pass rates on the Freshman Skills Assessment Program tests.

Previous evaluations have shown that large numbers of PFSP participants improve their basic skills upon completion of the Program. Many increase their scores substantially on the CUNY retests and accelerate their movement from remedial to regular course work in the college (see Bengis, 1981 et. seq.). A sizeable number pass the retests and are exempt from further remediation.

About 80% of all incoming SEEK and 90% of incoming CD students require remediation in at least one basic skills area. Each summer the PFSP enrolls about 25% of this group. The breakdown of enrollment by skills area is shown in Figure 1.1 below.

FIGURE 1.1

ENROLLMENT BY SKILLS AREA



As Figure 1.1 shows, enrollment rates in the senior and community college programs in all the basic skills areas were high. The fact that Baruch College SEEK, one of the largest programs, focused on improving the math skills of incoming students, accounts for the high math enrollment rate in the SEEK PFSP. A majority of the students took courses in two areas. None of the SEEK ESL participants took math, rather they concentrated on improving their reading and writing skills in language intensives.

READING

Overall, of the 823 students who enrolled in a reading course, 95.6% completed the course. Figures 2 and 2.1 present an overview of achievement in reading by program.

FIGURE 2
READING ACHIEVEMENT: ENROLLMENT, COMPLETION, AND FALL COURSE PLACEMENT

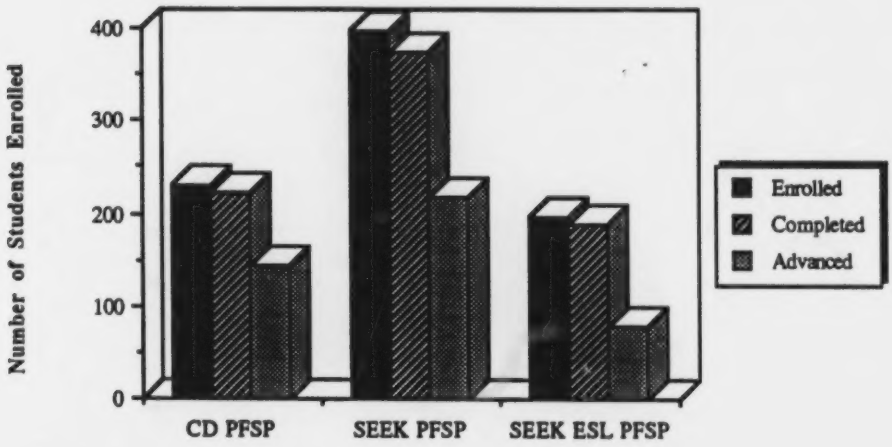
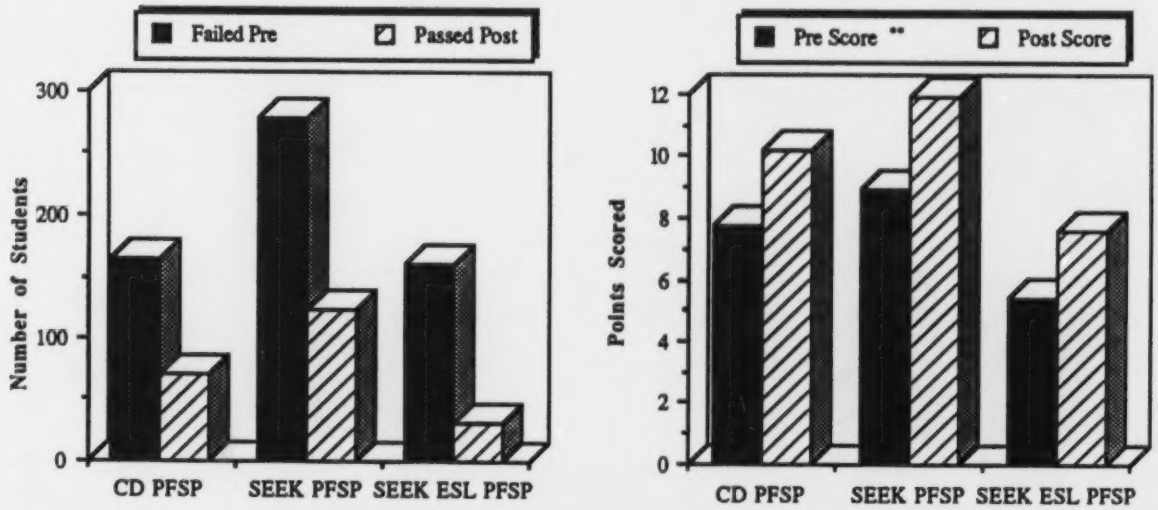


FIGURE 2.1
READING ACHIEVEMENT:
CUNY READING ASSESSMENT TEST RESULTS*



* Because different forms of the test were used, scores have been scaled to a common metric. The University-wide passing score is 12 of a possible 25 points.

** SEEK t=13.2 p<.001, one-tailed test; College Discovery t=8.4 p<.001, one-tailed test; SEEK ESL PFSP t=6.1 p<.001, one-tailed test.

Of the 97% SEEK PFSP and 94% CD PFSP students who completed the summer program, 59% of SEEK and 66% of College Discovery PFSP students either advanced to a higher level course or were exempt from further remediation in reading. This compares favorably with 52% (SEEK) and

55% (CD) in the previous summer. Advancement rates for SEEK ESL PFSP students were understandably lower, with 41% progressing to higher level courses in the fall semester.

There was a mean pre- to post-test score increase of 2.97 points for SEEK PFSP and 2.34 points for CD PFSP students in 1990, as compared to a mean increase of 2 points for SEEK and 1.8 points for CD in summer 1989. The 1990 pass rate of those who failed the pre-test was 44% (SEEK) and 43% (CD), while the corresponding figures for 1989 were 52% (SEEK) and 55% (CD).

Even though students in the SEEK ESL PFSP demonstrated a sizeable gain on the reading post-test, 2.2 points, only 20% of them passed the test. This is expectedly well below the pass rate for SEEK and CD PFSP students with English as the primary language. ESL students began the summer with reading test scores considerably lower than the other groups and generally require many more semesters of ESL instruction prior to passing the reading test. The 20% pass rate, however, is significant in that many of the summer ESL participants met University standards for reading. Others, who didn't, nevertheless improved their pre-to post-test scores considerably.

The above findings are consistent with past ones which support the PFSP as an important vehicle for the improvement of reading skills.

WRITING

A number of studies confirm that among entering students writing is the most difficult skill to strengthen and develop broadly, particularly in the relatively short span of a six-week summer program. This may be due to the fact that writing is an integration of diverse skills and requires students to synthesize many elements into an intelligible whole.

Consistent with past years, the progress made in writing was the least dramatic of the three basic skill areas, although not insignificant. Figures 3 and 3.1 show an overview of achievement in writing.

FIGURE 3
WRITING ACHIEVEMENT: ENROLLMENT, COMPLETION, AND FALL COURSE PLACEMENT

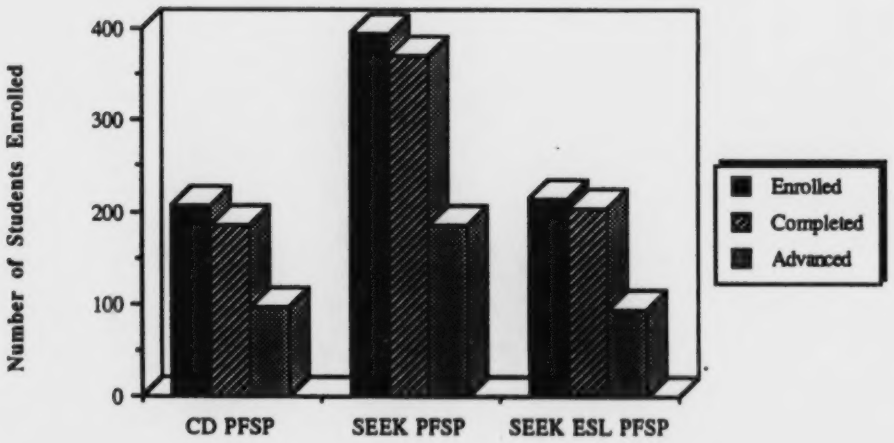
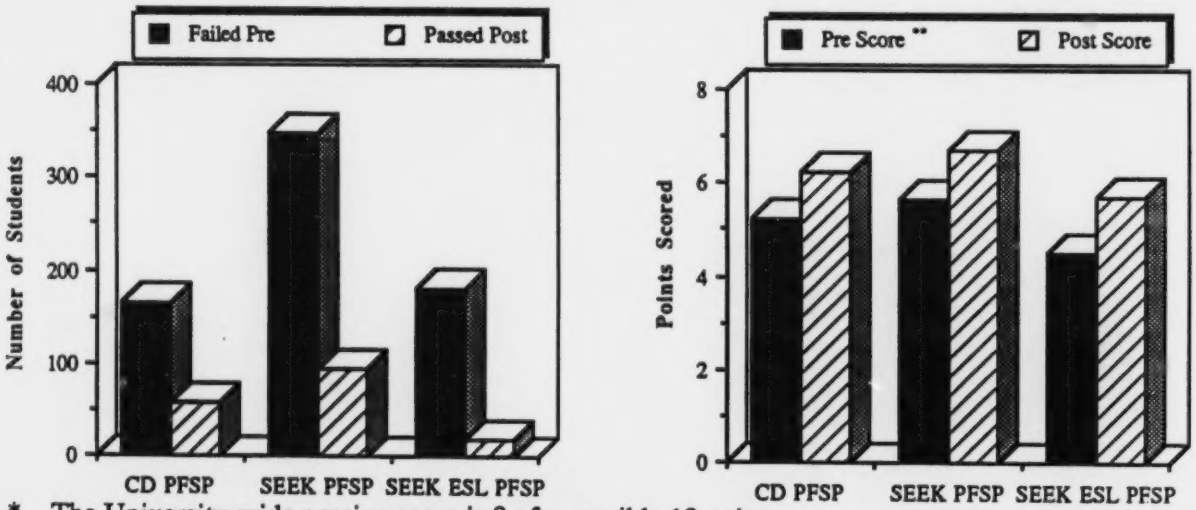


FIGURE 3.1
WRITING ACHIEVEMENT
CUNY WRITING ASSESSMENT TEST RESULTS*



* The University-wide passing score is 8 of a possible 12 points.

** SEEK PFSP t=7.4 p<.001, one-tailed test; College Discovery PFSP t=8.7 p<.001, one-tailed test; SEEK ESL PFSP t=3.2 p<.001, one-tailed test.

Slightly more than 50% of SEEK and 52% of College Discovery PFSP students who completed the program either advanced to a higher level course or were exempt from further writing remediation. During the previous summer the corresponding figures for both programs were 47% . As in reading, fewer students in the ESL writing courses moved to more advanced courses. Forty-six percent advanced, however, a sizeable number.

The mean pre- to post-test score increase in the PFSP was .92 points (SEEK) and 1.0 points (CD). The pass rate of those who had failed the pre-test was 26.6% (SEEK); 34.9% (CD). Last year's corresponding figures were 1 point increase on average for both programs and a pass rate of 29% (SEEK) and 28% (CD).

Although the ESL students demonstrated a slightly larger gain on the post-test (1.2 points) than the English as the primary language students, only 10% passed the post-test. It is important to note that ESL students began the summer with lower scores on the CUNY writing test than the other groups. Thus, while they showed a significant gain on the writing test in the short span of a six-week period, they require much more coursework and preparation before acquiring the proficiency in writing needed to pass the test.

MATHEMATICS

Historically, summer program students have exhibited their most dramatic improvement in mathematics. Each summer more students progress to higher level courses and pass the post-tests than in any other area .

The fact that math draws on more discrete skills than either writing or reading, that it is taught in modules, and that students in the summer program receive more of the individual instruction they often need to grasp difficult concepts may partially explain why improvement in math is greater than in other areas. It may also be that a six-week summer intensive course in a small supportive environment helps students overcome the math anxieties they may have built up over the years.

Of the 611 students who enrolled in a math course, 93% completed. Figures 4 and 4.1 give an overview of achievement in math.

FIGURE 4
MATHEMATICS ACHIEVEMENT: ENROLLMENT, COMPLETION, AND FALL COURSE PLACEMENT

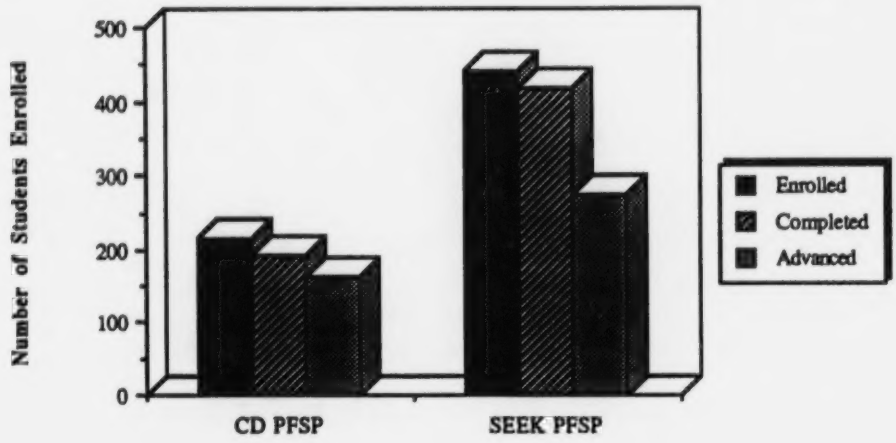
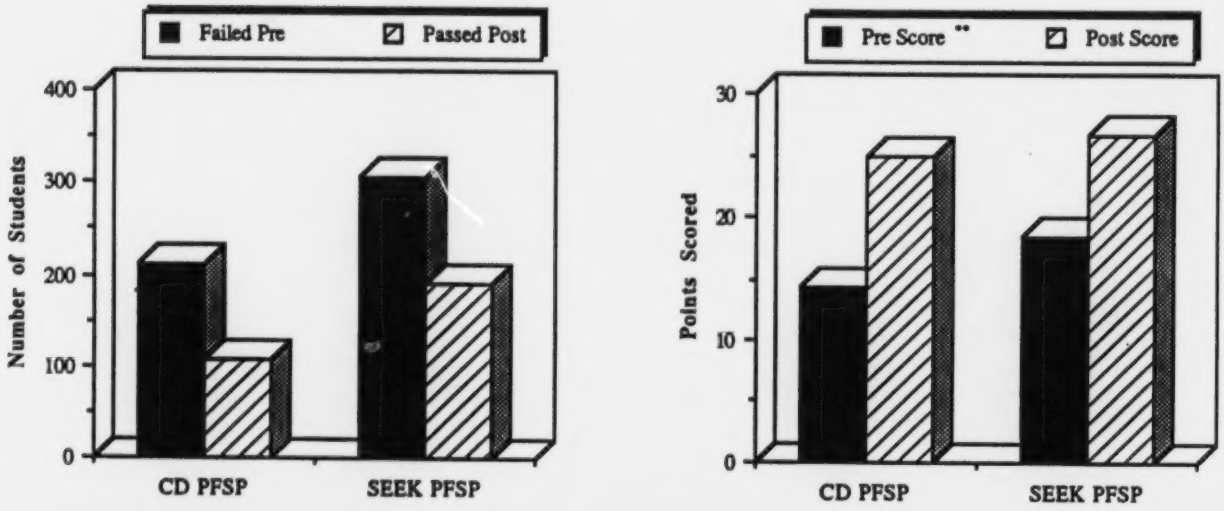


FIGURE 4.1
MATHEMATICS ACHIEVEMENT
MATHEMATICS ASSESSMENT TEST RESULTS*



* The University-wide passing score on the FSAP math test is 25 of a possible 40 points. Since Brooklyn College post-tested on the arithmetic portion only of the FSAP Math test, they were excluded from the results.

** SEEK t=24.8 p<.001, one-tailed test; College Discovery t=25.9 p<.001, one-tailed test.

In summer 1990 the 62.4% pass rate on the post-test for SEEK surpassed the 1986 all-time high of 57%. The pass rate for College Discovery mathematics enrollees was slightly over 50%, a modest decline from the previous year's 53% pass rate. The average point increase from pre to post-test was 9.6 for SEEK and 10.8 for CD, up from the 7.6 point increase of 1989 (SEEK) and the 9.8 point increase for College Discovery the previous year. As has been noted in previous evaluations, proportionately more math students in both programs moved to higher level courses in the fall than in either reading or writing, 65% in SEEK and 84% in College Discovery.

CONCLUSION

The City University's SEEK and College Discovery Prefreshman spring Program continues to be extremely effective in improving the basic skills of entering students, thereby lessening the time they spend in remediation and hastening their entry into college-level courses.

The vast majority of students complete the PFSP and the vast majority of these enroll in the fall. This past summer, student progress from pre- to post-test was greatest in math, followed by reading and writing. This is consistent with past findings that show the Program to be successful in the three areas, but particularly so in math. Many students passed the post-test and were exempt from further remediation. Others who did not develop skills to the level needed to pass the post-tests made sufficient progress to advance to higher level courses.

Clearly the SEEK ESL PFSP had a positive impact on the students it was designed to serve. The high rate of completion and achievement as demonstrated by movement to higher level courses in the fall semester and improvement in reading and writing post-test scores attest to its success.

SECTION II
1990 POSTFRESHMAN SUMMER PROGRAM

OVERVIEW

The success of the Prefreshman Summer Program and the continuing need for additional summer instruction for some students resulted in the expansion of summer programs during 1987 to include a Postfreshman Program which initially enrolled over 200 students. By 1988 the program grew to 302 participants and by the summer of 1990 there were 376 students enrolled in the program.

The Postfreshman Summer Program was developed after the model of the Prefreshman Summer Program, and was designed to serve continuing students who either had not attended the prefreshman program or who had attended but needed added support in order to complete the CUNY skills tests requirement of the University. The program goals were focused on students who had either already encountered difficulty in their coursework or had completed remedial instruction but still had not passed the tests. Thus, the college programs targeted students who had usually enrolled for one or two semesters and who needed additional instruction beyond that available in regular remedial and developmental sequences.

The programs have been able to use several effective approaches in their curricula including team instruction, integrated reading and writing, small group discussions, and a focus on psychological aspects such as time management, test anxiety, and self-esteem in group and individual sessions with the counseling staff. (Tutoring and counseling are integral parts of the program.)

The programs were developed and executed somewhat differently at each college. Colleges either concentrated exclusively on one skill area or presented courses in two or three course combinations. All were offered for a six-week period with instructional time varying from 12 to 18 hours per week. A special postfreshman program for ESL students was offered at Lehman College (See section I,the ESL report)

The program at John Jay College of Criminal Justice enrolled 35 freshmen who had completed two semesters but who had either failed at least two CUNY skills assessment tests and/or failed at least two remedial courses. This program utilized John Jay's "Curriculum Grid Project", which integrates instruction across the curriculum and was aimed at improving students' skills in reasoning, reading, writing and analyzing. In addition to strengthening these basic skills in the content courses, the program also incorporated counseling initiatives that were geared toward improving student motivation and self-esteem, and helping students deal with such topics as academic stress and anxiety.

The Postfreshman Program at Hunter College enrolled 132 students who demonstrated need for the intensive summer experience and who were already performing at levels that indicated readiness for advancement through the remedial sequence or into mainstream college courses. Course instruction in Math, writing and reading were scheduled four days per week, with classes lasting 1 1/2 hours each. Students spent four hours each week in tutorial laboratories, and 2 hours per week in counseling. Hunter employed an integrative/intervention paradigm which allowed for the integration of course instruction with intensive tutorial services and provided increased counselor/teacher collaboration that resulted in various intervention strategies on behalf of the students. The tutorial activities became part of in-class instruction and were expanded in the form of a tutorial laboratory that followed through on class instruction as well as counseling strategies taught to the students to help them improve their study skills.

New York City Technical College recruited 40 students who had been in attendance at the College for less than four semesters and who had not yet completed their remediation in reading, writing or mathematics. The format of the program provided for 30 class hours of instruction and 18 hours of individualized tutoring, which was coordinated with course instruction. Students were additionally

required to attend 12 hours of group counseling sessions, where the thrust was on issues concerning test anxiety, time management, academic planning, and class preparation.

Those enrolled in the Queens College Postfreshman Program included 30 students who had completed two or more semesters and who had still not passed one or more of the skills assessment tests. The instructional component, representing classes in reading, writing and mathematics, was augmented by counseling and tutoring. The program was characterized by a team approach whereby instructors, counselors and tutors integrated their assessments of students' needs and the activities necessary to improve the students' academic skills and resolved the problems that hindered achievement. Students received the various forms of instruction through individual meetings as well as group sessions with instructors, counselors, and tutors.

The Postfreshman Program at Baruch College was specifically aimed at offering intensive writing instruction to three groups of students: those who attended the 1989 prefreshman program and who failed their second semester English course; those who entered the college in fall 1989 and who failed their second semester English course; and students who had still not passed the Writing Assessment Test and who had been in attendance at least two semesters. A total of 56 students comprised two sections of the summer writing course which met four hours per day, three days per week for six weeks. The classroom schedule was broken down into segments of group instruction, writing time, group tutoring, and individual conferences. Students participated in group counseling once-a-week, where discussions centered around test-taking techniques, anxiety and stress reduction, time management, and self-confidence. Individual counseling sessions were also incorporated into the program.

Brooklyn College enrolled 27 freshman who had completed one or two semesters and who were still participating in the developmental education program. Such students had not yet passed all of the assessment tests, and therefore required additional instruction in the skills areas of reading, writing or mathematics. The program consisted of reading, writing and mathematics courses as well as counseling and tutoring activities. All phases of the program involved both individualized attention and group work with the students.

The Postfreshman Program at City College consisted of 56 students who had been enrolled for two or more semesters and who had failed one or more second-level remedial courses in reading, writing, or mathematics. As in the other programs, tutoring and counseling components were integral parts of the summer experience, as were individualized attention and group-oriented work. An integrated approach toward improving student skills and attitudes was followed as instructors, counselors and tutors were involved in the efforts of one another in serving the student in the most effective manner possible.

BACKGROUND OF THE STUDENTS

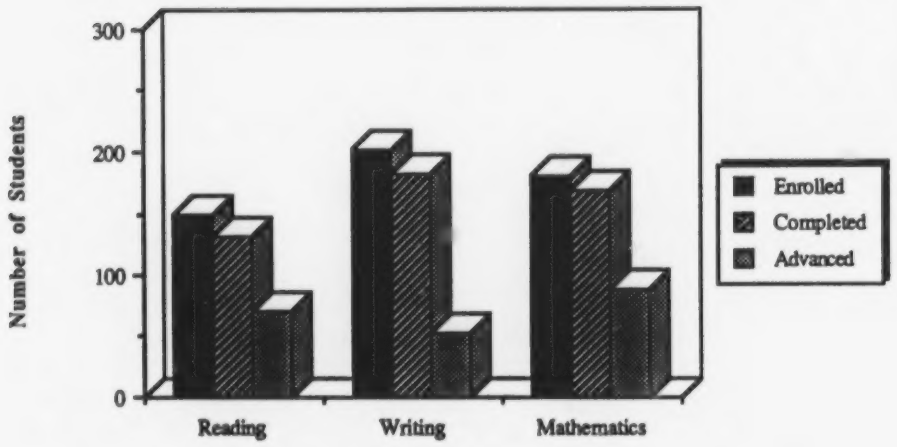
From questionnaire results obtained from students at the end of the summer program it appears that students attended the program primarily because they previously failed one or more of their college skills tests. Nearly three quarters were female students, mostly Black and Hispanic. About 10% said they were in need of childcare services. The majority were quite young with only 10% above the age of twenty-five and one third below the age of twenty. Most students had not attended college for more than two semesters although a quarter of them had attended for four or more semesters.

FINDINGS

ACADEMIC ADVANCEMENT AND RETENTION

The completion rates in all courses were very high. Most of the students who began course sequences in reading, writing, and mathematics completed them.

Figure 1
ENROLLMENT, COMPLETION , AND COURSE ADVANCEMENT IN READING , WRITING , AND MATHEMATICS



In the reading course, 131 of 149 students (88%) completed the course after enrollment. Of those who completed the course, slightly over 53% advanced to a higher level of remediation.

In the writing segment, 182 or 90% of 202 enrolled students completed the course. Twenty nine percent of those completing were able to increase their writing abilities sufficiently to advance to a higher level of remediation or to satisfy their writing competency requirements.This level of progress was lower than what was evident in the other two academic areas, a common finding in writing skills evaluations.

Even higher rates of completion were evident in the mathematics courses. One hundred and eighty students enrolled in the mathematics courses at the various campuses and 93% were able to complete the course. Fifty three percent of those who completed advanced one or more levels or completed their mathematics requirements.

SUCCESS IN ASSISTING STUDENTS IN PASSING THE COLLEGE SKILLS TESTS

The major intent of the Postfreshman Summer Program was to help students achieve passing scores in their skills tests. An analysis of student progress in various curricula is presented below. All students had completed their respective courses and had failed the CUNY skills test given at the beginning of the summer session. For each course combination, numbers of students enrolled, percentages who achieved passing scores, and changes in test scores from the beginning to the end of the summer session are presented in Table 1.

READING

The Postfreshman Program was effective in helping students achieve criterion performance in their reading tests (35% of all the Postfreshmen earned reading scores at or above the passing score level). The most effective course seemed to be one in which reading alone was the topic of the summer program. Forty-three percent of the postfreshmen reached the criterion score. It was also the curriculum in which students had the highest pre-test scores. Large gains in scores were evident in all courses except the three course combination (reading, writing and mathematics) in which gains were minimal.

Table 1

PASSING RATES AND TEST SCORE CHANGES IN VARIOUS COURSE COMBINATIONS IN THE POSTFRESHMAN PROGRAM

Reading Achievement

Course type	N	% Passed Skills test	Mean Pre-Test Score	Mean Gain
Reading &				
Mathematics	11	33	7.09	3.00
Writing	17	41	6.25	4.37
Writing & Mathematics	17	12	7.29	.18
Reading Only	37	43	7.86	3.85

Writing Achievement

Course type	N	% Passed	Mean Pre-Test Score	Mean Gain
Writing &				
Reading	28	17	5.67	.-07
Mathematics	18	30	5.44	.72
Reading & Mathematics	28	32	5.46	.93
Writing Only	88	24	5.75	.26

Mathematics Achievement

Course type	N	% Passed	Mean Pre-Test Score	Mean Gain
Mathematics &				
Reading	21	29	16.38	6.44
Writing	19	35	15.36	8.06
Reading & Writing	27	26	16.48	3.73
Mathematics Only	57	49	17.67	8.45

WRITING

Criterion level performance in writing is known to be more difficult to achieve than in the two other testing areas and this is evident for the Postfreshman Program. Twenty-two percent of the post-freshmen were able to progress to the criterion level. One of the reasons for a low passing success rate is the low pre-program performance level. The mean pre-test score is about 5.5 for postfreshman programs. Because a score of eight is required for passing, most students do not acquire enough new

skills in their summer program to achieve this terminal performance objective. The postfreshmen achieve the highest passing rates in the three course and writing and mathematics course combinations. The historical success in raising writing skills scores has been fairly low with test score gains averaging slightly above or below one point. Thus, writing is the most difficult college skills test for students to master.

MATHEMATICS

The students enrolling in mathematics classes and taking skills tests in mathematics have been more successful than those enrolling in other subject areas. Overall, 42% of the postfreshmen who completed the mathematic course attained passing scores on the skills test. The largest pre-to post test gains were achieved in curriculums which featured mathematics as the sole course. The students gained more than eight test score points in the Post Program . More strikingly, nearly 50% of the post students achieved score levels at or above the passing level.

CONCLUSION

High rates of program completion were evident in all curriculums, and many students in both reading , mathematics, and combinations of them were successful in attaining score levels which allowed them to progress to higher levels of subsequent remedial and developmental coursework or eliminated any need for further remedial courses. The Postfreshman Program reached high levels of performance in reading and mathematics and was only slightly less successful in writing.

SECTION III

1990 SUMMER SCIENCE, MATHEMATICS AND TECHNOLOGY INSTITUTE

OVERVIEW

SEEK students, when compared to regularly admitted students, enter college far less prepared in math and science than in other areas. Without a concerted effort, it is virtually impossible for them to bridge the gap necessary to pursue careers in the science and mathematical fields (Lavin, et al., 1983).

Evaluations of the PFSP indicated that there were students in need of specialized instruction in math and science in addition to the reading, writing, and mathematics basic skills offered in the PFSP. In Summer 1987, the Program therefore expanded to include a separate SEEK Science, Mathematics and Technology Institute (SMTI) for 100 students at three senior colleges (Brooklyn, Hunter and John Jay).

The SMTI is diverse in its offerings, depending on the particular institution's goals and student needs. Offerings range from computer programming courses to courses in pre-anatomy and physiology, essential skills for physics, pre-calculus and basic biological sciences. Some of the programs emphasize the integration of problem-solving skills with conventional content. Instruction is buttressed with extensive tutoring and academic and career counseling, including the exploration of science and math career options.

The results of external evaluations of the 1987 and 1988 SMTI showed than an average 90% of the students involved in the Institutes completed their work. Furthermore, in those programs where there was the possibility of progress to a higher level course, more than 80% of the students did advance, using the generally accepted metric of performance on University exams. Additionally, for both summers, students' evaluations of the Institutes were favorable (See Akst, 1987 and 1988).

The SMTI benefits participating students and also serves as a laboratory in which to experiment with curricular or pedagogical innovations. It was satisfying to note that a number of courses first offered on an experimental basis in the 1987 SMTI in fact have been institutionalized at their colleges, and are offered in the regular academic year as well. These include a special section of Core Studies 5 (Math Reasoning and Computer Programming) at Brooklyn College. In a course that normally had a 40% failure rate, 100% passed with the additional hours & tutors in the summer, smaller class size, and providing idea feedback with hands-on computer work. Hunter also institutionalized several math and computer courses first offered in the SMTI.

This report details findings from the 1990 SMTI at Brooklyn College, City College and Hunter College. Programs are described in terms of objectives, courses offered, tutoring services, counseling services, program organization and program results.

The three programs operating in Summer 1990 served 92 students--36 at Brooklyn College, 13 at City College and 43 at Hunter College. The students participating in the program were predominantly minority and female (representative of the larger SEEK Program), and so came from segments of the population under-represented in the mathematical and science fields.

The programs have a number of features in common:

- They offer SEEK students math and science courses, giving them either a head start on taking required courses or better preparation in the form of "bridge courses" to take these courses later on;
- The courses are offered under privileged conditions, in small sections, with extended hours, or with intensive tutorial support;
- The courses run 4-6 weeks in the summer;

- Counseling services and orientation sessions are available to meet the affective needs of the participants;
- Students are provided with stipends and book money, and their tuition is waived.

On the other hand, the programs vary a good deal one from the other, depending on such factors as the institution's goals, expectations, curriculum, size, problems, resources, and student preparation. Variations among the programs include the following:

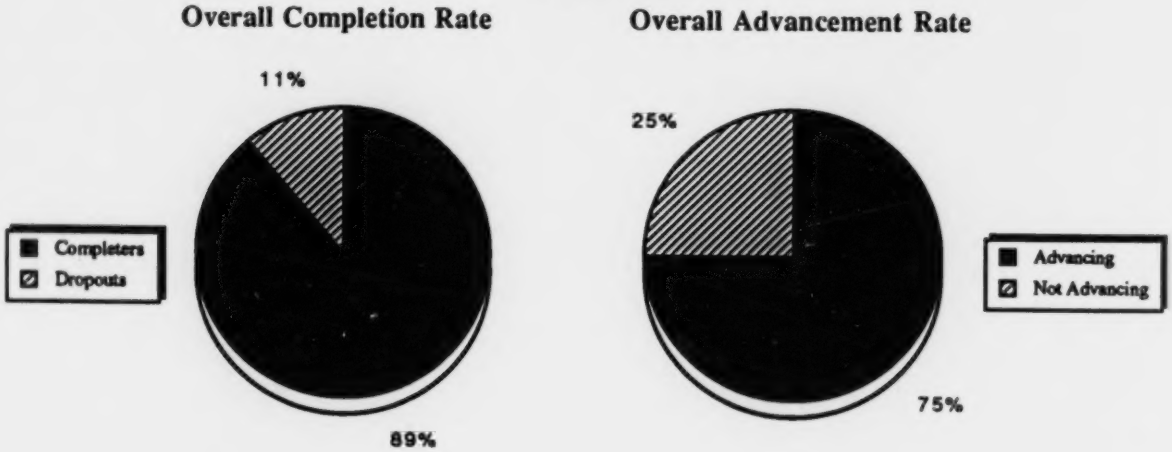
- Brooklyn's program includes 3 math courses, and serves mainly continuing students;
- CCNY's is science-oriented and aims at preparing incoming students interested in pursuing science-based majors for highly competitive mainstream introductory science courses;
- Hunter's program--the largest--offers math, pre-science, and computer courses to incoming students who have passed the CUNY math skills assessment test and to continuing students.

PROGRAM DESCRIPTIONS AND FINDINGS

OVERALL RESULTS

Of the 92 students who participated in an SMTI, 89% completed their work. Of those who completed and took a course with the possibility of advancement, 75% advanced to a higher level course.

FIGURE 1



BROOKLYN COLLEGE

Goals, Courses, and Context

Brooklyn College's summer program focused on the development of math skills. It involved pre- and postfreshman students (but predominantly postfreshmen) in three courses: Algebra (Math .2); Introduction to Mathematical Reasoning and Computer Programming (Core Studies 5); and Algebra and Geometry (Math .36). The goals of the program also remained constant since the program's inception in 1987:

(a) To ease the transition for participating students from high school-level to college-level mathematics;

(b) To provide these students with an introduction to computers; and

(c) To provide them with a positive experience relating to mathematics.

CS 5 (Mathematical Reasoning and Computer Programming) is the math component of the college's core curriculum. Although students taking this course tend to be in non-science curricula and rather weak in mathematics, they still must have passed both the CUNY math assessment test (CMAT) and a course in intermediate algebra (or Integrated Mathematics 3). CS 5 typically covers the following topics: algorithms, introductory programming, formal mathematical systems and proofs, rudiments of probability theory and combinatorial analysis. About 40% of students who start CS 5 during the academic year fail the course.

Math .2 (Algebra) is designed for postfreshman students who have passed the CUNY Math Assessment Test (CMAT) but are not sufficiently proficient in Algebra to proceed with a more

advanced remedial sequence. Math .2 covers such topics as: simultaneous linear equations, Cartesian coordinates, and Pythagorean Theorem.

Math .36 (Algebra and Geometry) is a course for pre- or postfreshman students who have passed the CMAT but have not had the equivalent of Sequential Math 2 in high school. This bridge course prepares students to proceed either to Core Studies 5 or pre-calculus. The curricula includes but is not limited to linear equations, quadratic equations and coordinate geometry.

The courses differed from regular academic year sections in a number of ways:

(a) They were offered through SEEK;

(b) The number of hours which the courses met was greater than usual--the equivalent of 8 instead of 4 hours per week for Algebra, 4 instead of 3 hours per week for Mathematical Reasoning and Computer Programming and 3 instead of 2 hours per week for Algebra and Geometry;

(c) Sections were small--17 students in CS 5 instead of large lecture sections, 14 students in Algebra, and 5 students in Math .36, the bridge course to college level algebra;

(d) In the summer Core Studies 5 section, students had much more hands-on contact with computers than is usually the case. The instructor not only gave lectures but also assisted students on the computer--in the traditional arrangement, the teacher is absent from computer hands-on sessions. Students spent considerable time studying teacher-made programs, working on assignments relating to these computer programs, and taking tests on the computer. The curriculum was enhanced with topics drawn from elementary number theory and statistics.

Tutoring

Peer tutors--students who had already passed the courses--were available to help the students in the class. In Core 5 they helped participants learn to use the computer and to carry out their assignments on the computer.

Counseling

As in the previous summers, a counselor was available in the Brooklyn summer program to meet with math instructors, and to discuss with students their individual concerns--whether academic, personal, financial or vocational. The counselor visited both math classes, explaining his function and when he was available. When he learned of problems, the counselor called students at home to encourage them to come in for a discussion. Common student problems included: the inability to manage time, difficulties in deferring gratification, and personal and career worries. The counselor referred students to other needed college resources on a number of occasions.

Administration and Staffing

The program, which ran from June 25 to July 26, was administered by the SEEK Director and Assistant Director. The math instructors and the counselor were members of the academic year staff.

Program Results

Results this summer were impressive, as the table below on Course Enrollment, Completion and Advancement indicates:

TABLE 1

COURSE ENROLLMENT, COMPLETION AND ADVANCEMENT

Course	Enrolled	Completed	Advanced
Core Studies 5 (Intro. to Mathematical Reasoning and Computer)	17	17 (100%)	17 (100%)
Math .2 (Algebra)	14	10 (71%)	6 (60%)
Math .36 (Algebra and Geometry)	5	4 (80%)	3 (75%)
Total	36	31 (86%)	26 (84%)

In Core Studies 5, 14 of the 17 completers (82%) earned a C or better, with 4 students receiving an A. These are excellent results considering a 40% failure rate during the academic year.

In Math .2, only 3 of the 10 completers (30%) received a C or better grade while in Math 36, 2 of 4 completers (50%) did so.

Overall, 84% of the participants advanced to a higher level math course in the fall semester.

THE CITY COLLEGE OF NEW YORK

Goals, Courses, and Context

This was the third year the City College offered its Summer Institute in Science, Mathematics and Technology. The goal of the program is to prepare incoming SEEK and regularly admitted students interested in pursuing science-based majors for highly competitive introductory mainstream science and math courses which many students now fail. The program attempted to create a highly supportive environment in which participants study conventional content as well as problem-solving skills.

The objectives of the summer program were:

1. To identify, recruit, and retain students who intend to major in architecture, engineering, nursing, or the sciences;
2. To develop reasoning and problem-solving skills within the context of lab work in science in order to prepare students for undergraduate courses in introductory science;
3. To develop communication skills in the context of small-group, peer problem-solving activities based on content (lab experiments, demonstrations) in the students' chosen fields;

4. To develop mathematics skills needed in required preprofessional and professional courses in chosen fields;

5. To develop effective study skills;

6. To introduce students to their chosen careers--knowledge and appreciation of the requirements to be met in preparation for a career and an understanding of the work of the profession;

7. To form networks for mutual support and assistance.

Participating students were divided into various groups according to their major--nursing, architecture, engineering, science, etc.--with some 5 to 15 students in each group. Students in a group attended a number of separate but related components--the divisional activities, the project sessions, the career seminars, and the study sessions. In addition, the students took part in a chemistry lab and a physics lab, and also counseling activities (described below).

(a) **The Chemistry Lab and the Physics Lab** - These labs involved various pre-science activities, classes, demonstrations and experiments. An emphasis was placed on general problem-solving strategies as applied to chemistry and physics. Students performed experiments --one per week-- to progress from concrete, hands-on laboratory activities to abstract reasoning. Faculty gave lectures which prepared students for the labs.

(b) **Study Sessions** - Guided by an upper-division student, participants in these study sessions solved problems which surfaced in the labs and lectures, went over homework and quizzes, and discussed projects together.

(c) **Divisional Activities** -These classes involved a variety of activities related to the students' fields of interest. For example, nursing students studied library skills, and learned about the use of computers in the administration of medication. Engineering students studied design, and architecture students studied drawing. Students discussed how the lectures and experiments from other sessions related to their particular field of interest. In addition, all groups dealt with writing and communication skills.

(d) **Project Sessions** - Each week, students worked on a different project in their field. For example, the nursing group learned how to take pulses one week, while the architect group redesigned a room.

(e) **Career Seminars** - These seminars were intended to provide students with an understanding of their intended professions. Participants watched relevant video tapes, held discussions relating to career opportunities, and toured laboratories, hospitals, engineering facilities, and professional firms.

Tutoring

Students received tutoring almost every day in their study sessions (as described above). After-class tutoring was also available on a limited basis.

Counseling

There were several types of counseling available in the CCNY program:

(1) All SEEK students met with a counselor four times--twice during each of the first two weeks of the program--to discuss study skills, time planning, note-taking, reading skills, test-taking skills, and problems of their home environment;

(2) In addition, each student group met with a counselor once a week for discussions related to their field;

(3) Finally, each SEEK student was required to attend several one-on-one personal counseling sessions. These sessions dealt with personal problems, financial aid advice, and academic concerns.

The counselor sat in on classes every day, to help understand some of the academic problems which students were facing.

The counselor in charge noted that there was a striking pattern of problems among SEEK students: serious financial problems, public assistance difficulties, and non-supporting parents.

The Students

To be eligible to participate students had to have chosen science-based majors. In addition, they had to have scored reasonably well on the CUNY reading and writing proficiency exams (24 or higher and 6 or higher, respectively) and also passed the CUNY math proficiency test (25 or more) but not necessarily passed the elementary algebra section of the college's placement exam.

Eligible students were identified by computer, sent letters and telephoned. As a result of this effort, 13 incoming SEEK students--all highly motivated--joined the program.

Organization and Staffing

City College's Summer Institute in Science, Mathematics and Technology started on July 2 and ran through July 26.

The program was directed by a counselor in CCNY's SEEK Program. The program staffing was quite complicated, involving half a dozen faculty members, lab technicians, a skills coordinator, a science coordinator, a full-time counselor, as well as a number of graduate students.

Program Results

Although students took weekly quizzes in the physics and chemistry labs, there were no final grades given in the CCNY program. Rather, the focus was on the development of reasoning and problem-solving skills, completion of assigned projects and mastering of weekly content. Also, since students were preparing for content courses rather than taking remedial courses, advancement rates were not relevant.

All 13 of the SEEK students participating in the program completed it.

Pre and post-student questionnaires were administered to evaluate the program. The questionnaire provided self-report information regarding the main program objectives. Overall, the program was perceived as one that creates an invaluable head start to academic work at City College. The majority stated that the program had improved their math skills, that they had

learned how to reason and problem-solve better and had developed a network of friends for mutual support and assistance.

HUNTER COLLEGE

Goals, Courses, and Context

Hunter College's SEEK Science/Math/Technology Program offered two pre-science courses, a mathematics course (Essentials of Algebra) and a Computer Orientation Workshop. In addition to the technical courses, students in the summer program attended once-a-week orientation sessions.

The major goals of Hunter's Program, as they were last summer, were:

(a) To provide students with the opportunity to increase their competency in mathematics, the sciences, and computer usage so as to meet their science and math requirements; and

(b) To expand students' career options in these fields.

Hunter College requires all students earning a bachelor's degree to take 10 to 12 credits in math, science, or computer courses. An important objective of Hunter's Department of Academic Skills (SEEK) is therefore to prepare SEEK students--many of whom enter Hunter underprepared in technical areas--for these courses.

The two pre-science courses offered were ACSK 003 (Pre-Anatomy and Physiology) and ACSK 019 (Basic Skills for Chemistry). Each of these courses dealt with the basic concepts and vocabulary of the introductory science course to which it leads. For example, the pre-chemistry course dealt with: heat calculations; gases; chemistry of elements; bonding; and properties of solutions.

The goal of the math course, Essentials of Algebra (ACSK 013), was to prepare SEEK students for the Math Department's course in pre-calculus (MATH 120, Elementary Functions) which only 45% of SEEK students pass on their first attempt. The content in ACSK 013 includes a review of elementary algebra and then moves on to topics in intermediate algebra, and an introduction to analytic geometry and trigonometry. ACSK 013 was open to students who had passed ACSK 011, a course in arithmetic and basic algebra.

The computer workshop, Computer Orientation, aimed to develop computer literacy by introducing students to the microcomputer and its basic components. It covers major application packages, notably word processing, and more briefly, DOS and BASIC. Essentially an expansion of a one-shot 3-hour workshop which had been offered previously, it was held in the Academic Skills Computer Lab which houses a dozen IBM PC's and several Apple II's, and provided students with a good deal of hands-on activities.

Tutoring

Tutors were available in all classes to assist students. Out-of-class tutoring by appointment was also offered daily. Students typically signed up for 2 hours per week of tutoring. Virtually all tutors in the program were experienced, continuing in that capacity from the previous spring semester.

Counseling

A one-hour-per-week orientation session focusing on career planning, program planning, time management, motivation, getting along in college, and study skills in the sciences was offered.

In addition, individualized counseling was available to students on a drop-in basis. Students came for counseling on a wide range of personal matters which can significantly impinge upon academic performance, ranging from work and parenting problems to poverty and even homelessness.

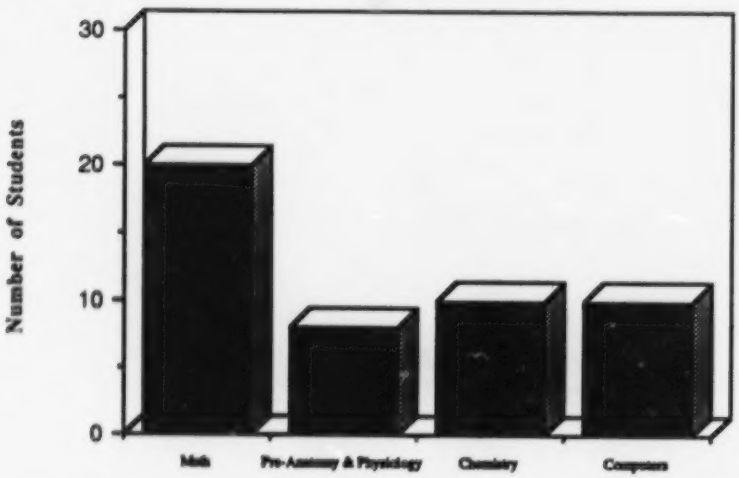
The Students

Hunter's program remains the largest, with 43 students. All had to have completed basic math remediation to participate in the SMTI. Most (about 90%) were continuing students who had expressed an interest in pursuing health-related or other technical fields of study, and were preparing to take pre-calculus or science courses. Most took one course and orientation. About a third of the students started Hunter prior to the Fall '89 semester.

Below is a graph showing the distribution of students by course.

FIGURE 2

Course Enrollment



Recruitment was conducted via a memo sent to counselors and to teachers of ACSK 012 at the time of final exams. In addition, a notice appeared in the SEEK student newspaper.

Administration and Staffing

All faculty working in the program were regular full-time SEEK professors or adjuncts with many years experience. The Coordinator serves as the SEEK Tutoring Coordinator during the academic year. The program ran from July 5 through August 15.

Program Results

The vast majority of students in the pre-science, math and computer sections completed their courses--38 of 43 program participants, or 88%. This breaks down as follows: Essentials of Algebra, 90%; Pre-Anatomy and Physiology, 100%; Chemistry, 91% and Computers, 80%.

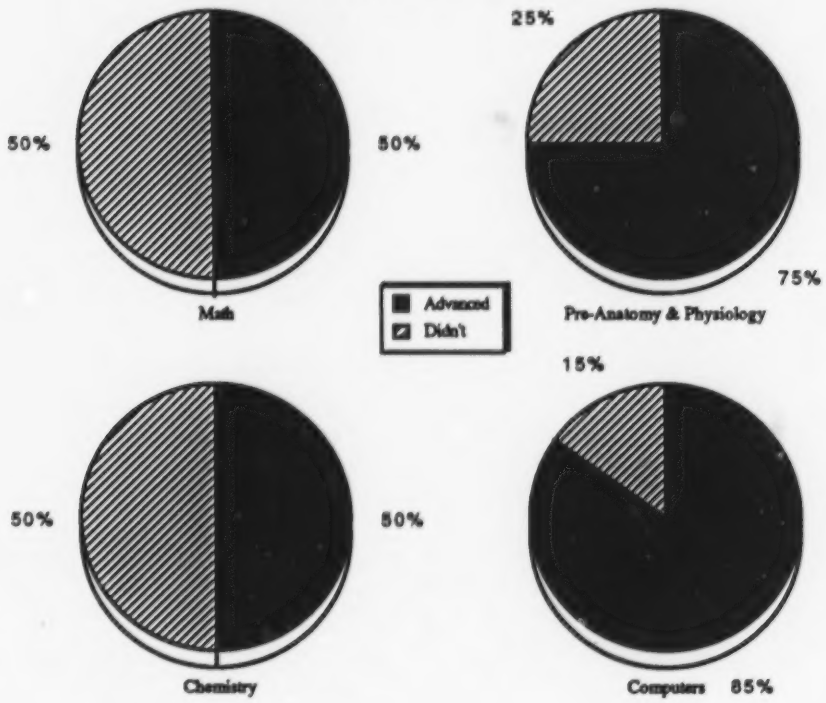
In the pre-anatomy and physiology course and in the math course where teacher-made pre and post-tests were administered, mean scores increased dramatically: from 30 to 78 in math and from 23 to 80 in pre-science.

All of the students in the computer course earned a grade of A (advance), and so were better prepared to succeed in CSCI 130 (Introduction to Computer Science).

The graph below shows advancement rates to higher level courses for each of the summer course completers.

FIGURE 3

Advancement Rates



CONCLUSION

The SEEK Science, Mathematics and Technology Institute at Brooklyn College, The City College, and Hunter College continues to make a significant contribution in preparing students for more advanced college-level math and science courses and for careers in related fields. The students' high rate of program completion and advancement attest to its effectiveness.

As laboratories for institutional innovation, instruments of social policy and developing strategies for educational intervention, these programs are outstanding examples of the commitment of The City University to the twin goals of access and excellence.

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